THE RELATION OF THE RAILROAD TO THE CITY WATER PLANT[1]

By C. R. Knowles

During the year ending June 30, 1916 the Illinois Central Railroad Company purchased water amounting to over $100,000 from 34 water plants in Illinois alone. This is an average of nearly $3,000 per year paid each plant. At none of the points included in the above figures does the annual expense for water fall below $600 a year and at some points, Centralia for example, the expense amounts to over $12,000 annually. Using as a basis of estimate the water purchased by the Illinois Central in this state, the railroads of the United States purchase annually from city water plants over $10,000,000 worth of water. This represents no inconsiderable proportion of the revenue from the operation of these plants.

The consumption of water for all purposes by the railroads of the country is estimated to be nearly 700,000,000,000 gallons per year. Compared with this enormous figure, the water purchased from city plants is small, and it would appear that the railroads are undeveloped as a field for the sale of water. This brings up the question as to what should be the relation of the railroad to the city water plant. Should it be the same as the ordinary householder using only a few thousand gallons, or that of a large, long-hour, high-load-factor consumer, whose business permits utilizing the reserve pumping capacity, thereby increasing the efficiency of the plant.

The cost of supplying water may be divided into two charges; first, the fixed expense or cost of readiness-to-serve, which remains the same regardless of whether the plant is operated to full capacity or not; second, the operating expense, which varies with the amount of water pumped. Assuming the plant has ample reserve capacity the cost of furnishing water to the railroad or other large consumer will consist of the fuel, chemicals, oil, waste, etc. Any return in excess of the actual operating expenses for furnishing such water

[1] Read before the Illinois Section at Urbana on March 13, 1917.

may be applied to the reduction of the overhead expenses to other consumers.

Companies furnishing electricity for power are probably the most efficiently conducted public service institutions in existence. This efficiency is largely attained through operating the power plants to their full capacity by securing an output for the power produced through attractive rates to large consumers utilizing the off-peak load. The prevailing rates for electric power in Illinois are from 4 to 11 cents per kilowatt hour. Special rates for large, long-hour, high-factor consumers and discounts for off-peak service, however, bring the cost down to 1 and $1\frac{1}{2}$ cents per kilowatt hour. The electric power companies have made these low rates for two reasons: first that the highest efficiency is attained when the plant is operated under full load, and second, from a realization of the fact that there is a limit to charges that may be made for electricity and that limit is reached when the cost of current equals the cost of steam or other power.

The same thing is true of a railroad water supply. The limit is reached in cost of water from city plants when the cost equals or is in excess of what it will cost the railroad to pump its own water. The railroad is in a position to say what the water should cost by reason of having a water department organization, and perhaps in this respect has a different relation to the water plant than other large consumers. The fallacy of a universal rate for water to all consumers regardless of consumption is recognized by most water works managers and sliding scales of rates are established in many instances. These rates are, of course, based upon all expenses, fixed and otherwise, and do not provide for differential treatment of large consumers where it is necessary to make certain concessions in order to hold the business or secure new custom.

No better exposition of the advantages of differential treatment of customers can be given than that of Messrs. Knowles and Scharff in their paper on "The Relation of Out-of Pocket Cost to Rate Making" in the *Proceedings of the Illinois Water Supply Association*, 1914, an extract from which reads as follows:

> There remains, then, only the second basis which seems to us proper as a reason for differential treatment of consumers—in order to lower the cost to other consumers by retaining custom which would otherwise be lost. How this works out may be very readily explained. Assume a small waterworks with a gross income, which must be collected when it is supplying 1,000,000 gallons

per day, of $35,000. Now suppose one large consumer using 100,000 gallons per day and paying $3500 per year should find that he could secure water elsewhere at a cost of $2500 per year, and should disconnect from the mains. The amount supplied would drop to 900,000 gallons per day; but interest, depreciation and maintenance would remain practically the same; it would still be necessary to have the same number of engineers and firemen; and the only saving would be a small amount of fuel, alum, hypochlorite, oil and waste, etc., which would certainly not be in excess of $1000 per year and would probably be a great deal less. So that the gross income to be raised might be reduced to say $34,000, all of which would have to be raised from other consumers. Now if all other conditions remained the same, and the rate for the large consumer were reduced so as to just hold his custom, when paying $2500 per year, the total gross income would still be $35,000 and the portion to be raised from consumers other than the large one would be $32,500 or $1,500 less than in other cases. Their rates could, of course, be correspondingly lower than would be necessary if the large consumer were lost. The advantage of such an arrangement to all of the consumers is obvious, and such differential treatment, if necessary to secure this advantage, would not only not constitute discrimination, as we have defined it, but would appear to be a plain duty of the water-works as a public utility.

In brief, it is to the advantage of all consumers that large, long-hour, high-load-factors consumers be retained. Differential treatment of them does not constitute discrimination, so long as it will result in advantage and saving to other consumers. Such concessions in rates, however, must not be greater than actually necessary to meet the competition of other sources of supply, as in any case, they must not be so great as to increase instead of decrease the income to be collected from other consumers. Thus, in the case cited above, if it were possible to get the business at $2500, any rate less than that sum would constitute discrimination. If it were really necessary in order to meet competition, any rate greater than $1000 per year would effect some saving for other consumers, and would be justifiable. A rate less than $1000, however, would make the amount to be collected from other consumers greater than if the large consumer ceased entirely to take service. This would certainly be discrimination under our definition.

In view of the facts as to rate making, as brought out above, it would appear that in many instances more attractive rates could be made the large consumers, such as railroads, rather than suffer the loss of business that will perhaps decrease the income to such an extent as to make it necessary to increase the rate for water furnished to the remaining consumers to make up the deficit. Aside from the advantage of the large consumer in keeping down the unit cost through absorbing a portion of the overhead or readiness-to-serve expense, a number of instances might be cited where the acquisition of one or two large consumers has made it possible to enlarge and improve the pumping plant and even construct new plants.

A writer in *Engineering and Contracting* of July 12, 1916, strongly advises the water works managers to cultivate a wider market for the sale of water by encouraging irrigation of truck farms and family gardens. He states further: "Water is a marketable commodity. Were as much ingenuity expended in marketing water as electricity there is probably not a water works plant in America that would not be able to double the quantity of water sold." Undoubtedly there are great possiblities in encouraging new uses for water, but as water is one of the prime necessities in the operation of a steam railway the market is already at hand and the water works manager would have but little difficulty in finding a market for the sale of water if he would apply the same methods that prevail along other business lines, namely, divide up the profits with the customer, if necessary to get the business.

DISCUSSION

E. MacDonald: The idea that a railway should get lower rates than anyone else seems entirely wrong. According to the author, the water department should make rates for other customers sufficiently high to pay all its overhead expenses, in addition to a fair profit above operating expenses, and then, because the overhead charges have been taken care of, the railway should be excused from paying its share of them, simple because, as he said, the investment has been made and reserve supply is obtainable and any additional business which would utilize the reserve ought to be given the lower rate.

The author mentioned the electrical industry and the methods of electrical men giving power consumers much lower rates than lighting consumers, because the plant originally was built for furnishing light and without any power load would be idle during daylight hours. The speaker thought that electrical installations can be found where exactly the reverse is true: where electrical plants were built solely for furnishing power. In such cases, why not say that any lighting load that could be taken on in the evening, when the power load is off, should receive a lower rate, because the power load is paying for all fixed charges, etc., and the lighting load merely utilizes an available reserve. A railway should not be given lower rates because it can and does utilize some very inferior waters.

Theodore A. Leisen: It would appear to the speaker that the suggestion for a special low rate for water furnished to the railroads

might very justly open the way for a charge of discrimination from smaller consumers, even assuming that the author advocates such low rate for all large consumers and not exclusively for the railroads. The speaker has in mind an instance in Wilmington, Del., where one leather manufacturer consumed water to the amount of approximately $14,000 per annum, a quantity equal to or greater that that of the largest railroad consumer in that city. If the water department had charged this manufacturer a much lower rate than smaller manufacturers in the same line of business, and there were several of them, it would have placed a handicap on the production cost of the small manufacturers and probably would have resulted in a justifiable charge of discrimination.

The conditions which cover supplying electric current in wholesale quantities for power and those for furnishing water are not analogous, for the reason that the electric light corporation can maintain a more even power load by supplying power current during the daylight hours when the lighting load is at its minimum, whereas the large consumers of water usually require their maximum quantity at the same time that the general consumption is at its maximum stage. In a system where direct pumpage is in effect, the load factor is thereby abnormally unbalanced, in contradistinction from the conditions governing the electric light plant.

The best system of metered water ratings is obtained by making a fair service charge on every metered connection, graded in proportion to the size of the meter, and then charging all consumers at the same unit rate for all water consumed. The service charge should be based on a proper proportion of the fixed overhead charges, plus the cost of reading and maintaining the meter, and the unit rate for water should be placed at the lowest possible figure consistent with the revenue requirements to cover production costs and other expenses which have to be met through the revenues.

This system has the merit of treating all consumers on the same basis and eliminates any question of discrimination, while it actually provides a gradually lowering rate in inverse ratio to the quantity consumed, through the virtual absorption of the service charge into the larger consumption figures.

W. J. SPALDING: The speaker approves Mr. Leisen's theory of dividing the charge for water into two elements, a ready-to-serve

charge which covers the fixed expense incurred regardless of the water consumed and proportioned to the size of the meter, and, in addition, a uniform rate for water. This method will automatically work out a different rate for each user according to quantity consumed. There may be some cases in which, as a matter of expediency, the water department would be justified in giving to a railroad company or other large user a special rate, but it would be very hard to show that they were entitled to it as a matter of justice. The author would like to have us assume that in the case of the railroad we are selling the surplus from our plant. What right have we to single out one customer and assume that the water he gets is surplus any more than that of any other customer? Such an assumption is arbitrary and cannot be defended on the grounds of equity.

C. L. KÖHN: Regarding the selling of water to railroads at a cheaper rate than to other consumers, it is essential for a city water plant to acquire large consumers. It would be quite a loss to lose a consumer paying the department hundreds of dollars annually. Every water department generally sees to it, or should do so, that its supply is adequate for the increase of consumption with the growth of the city. If large mercantile houses can and do find it profitable to do both a wholesale and retail business, why should not the same rule apply to the sale of water under certain conditions. It must be evident that a large consumer saves expense to the department for various reasons.

For instance, our householders' average yearly bills amount to $9. In order to receive a revenue of $3000 it would be necessary to have 333 small consumers. The cost of meters alone would be approximately $3000; the cost of installation of services and their maintenace, reading meters, collections, bookkeeping, etc., are also items to be considered. The sliding scale is the fair and proper way to sell water.

A franchise was granted the Western United Gas & Electric Company in Elgin, embodying the following clause:

> *Provided:* The company may supply gas at reduced rates to the Elgin National Watch Company and other wholly industrial concerns, whose unusually large consumption of gas under the conditions of delivery, in the discretion of the company may make such reduction as appears advantageous to said concerns.

This provision permits good business.